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14. ABSTRACT
This was a grant to cover partial cost of the organization of the 7th International Conference on Mathematical and Numerical Aspects of Waves, held at Brown University, Providence, RI, on June 2-24. 2005. It was the 7th WAVES conference with the first one taking place in Strasburg, France in 1991 and every 2nd or 3rd year since then.
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Final report for AFOSR grant: 7th Conference on Mathematical and Numerical Aspects of Waves (WAVES'05).
PI's: Jan S. Hesthaven.

This was a grant to cover partial cost of the organization of the *7th International Conference on Mathematical and Numerical Aspects of Waves* held at Brown University, Providence, Rhode Island on June 20-24, 2005. It was the 7th WAVES conference with the first one taking place at Strasbourg (France) in 1991 and every 2nd or 3rd year since then.

WAVES remains the only international conference that covers this diverse research area in sufficient breath and depth with conference themes including forward and inverse scattering, fast computational techniques, numerical analysis, absorbing layers and approximate boundary conditions, analytic and semi-analytic techniques for wave problems, domain decomposition, guided waves, random media etc.

The continuation of WAVES at Brown University in 2005 helped to provide stability and continuity in the dissemination of new results and methods for wave problems. Results presented at previous WAVES conferences have found their way to several application codes, including electromagnetics, inversion method in imaging etc and we are confident this will also result from this event. An important mission of WAVES is the education of the new cadre of applied mathematicians and engineers in computational and analytic techniques for solving wave problems. As the leading conference in this very important research topic it attracted most leading researchers, thus providing an excellent opportunity for students and young researchers to meet senior people and get a unique view at the state-of-the-art of the ongoing research activities.

Historically, these conferences are co-organized between a host institution and INRIA-Rocquenquer (Paris, France). For the 2005 conference, it was co-organized with Brown University (local organizers are David Gottlieb, Jan S Hesthaven, and Chi-Wang Shu) and University of Delaware (represented by Peter Monk).

The total number of participants to this conference exceeded 130 – about the same number as for the most recent conferences. More than 30 students participated at a significantly reduced registration cost. About 30 women and underrepresented minorities (African-American and Hispanic) attended. The attendees represented academic, industry, US national laboratories as well as international participants from Europe, Asia, and Australia.

More than 125 talks were presented in sessions with contributed talks, in 3 parallel sessions, offering examples of theory developments as well as applications of high-order and spectral methods. These talks were of 25 min duration with 5 minutes for Q&A. There were 7 invited talks, offering an overview of several recent and exciting developments in this very active research area. The speakers, their affiliation, and title of their presentation were

C. Bardos, *Time-Reversal in a Finite Cavity Effect of Ergodicity and Randomness.*

G. Uhlmann, *Electrical Impedance Tomography and Travel Time Tomography.*

O. Bruno, *New High-Order Methods in Computational Acoustics and Electromagnetics: High-Frequency Problems.*

G. Iooss, *Standing Gravity Waves in Deep Water.*

F. Cakoni, *Qualitative Methods in Inverse Electromagnetic Scattering Theory.*

C. Bailly, *An Overview of the Use of Linearized Euler Equations in Aeroacoustics.*

I. Perugia, *Analysis of Discontinuous Galerkin Approximations of the Maxwell Eigenproblem.*

A selection of peer-reviewed journal papers, reflecting the breath and depth of the conference, will appear as a special volume of Journal of Computational and Applied Mathematics and we expect, as has been the case for all past WAVES conferences, that this volume will become a standard reference for research and students in this rapidly expanding research area over the next few years.

Impact of conference.

Many of the invited and contributed talks contained new theoretical results and computational techniques for wave problems, not previously published. The general research area of numerical and mathematical methods for wave problems remains a very active and thriving research area throughout the work. The conference offered an excellent view into what is currently being considered and where the main challenges are found.

The conference offered the participating students and young researchers a unique opportunity to meet leading researchers in this field as well as get a very good impression of the main areas of activity. Several of the plenary lectures had an overview character, emphasizing important open questions and interesting new research directions. Furthermore, during the organization we had emphasized the need to display many of the application areas, mature as well as emerging ones, for these methods.

The general atmosphere of these conferences are very collegial and international – something that was greatly appreciated by students and young researchers which, as commented many times, found the conference very useful as a way of building new connections and getting to meet senior researchers in the field.